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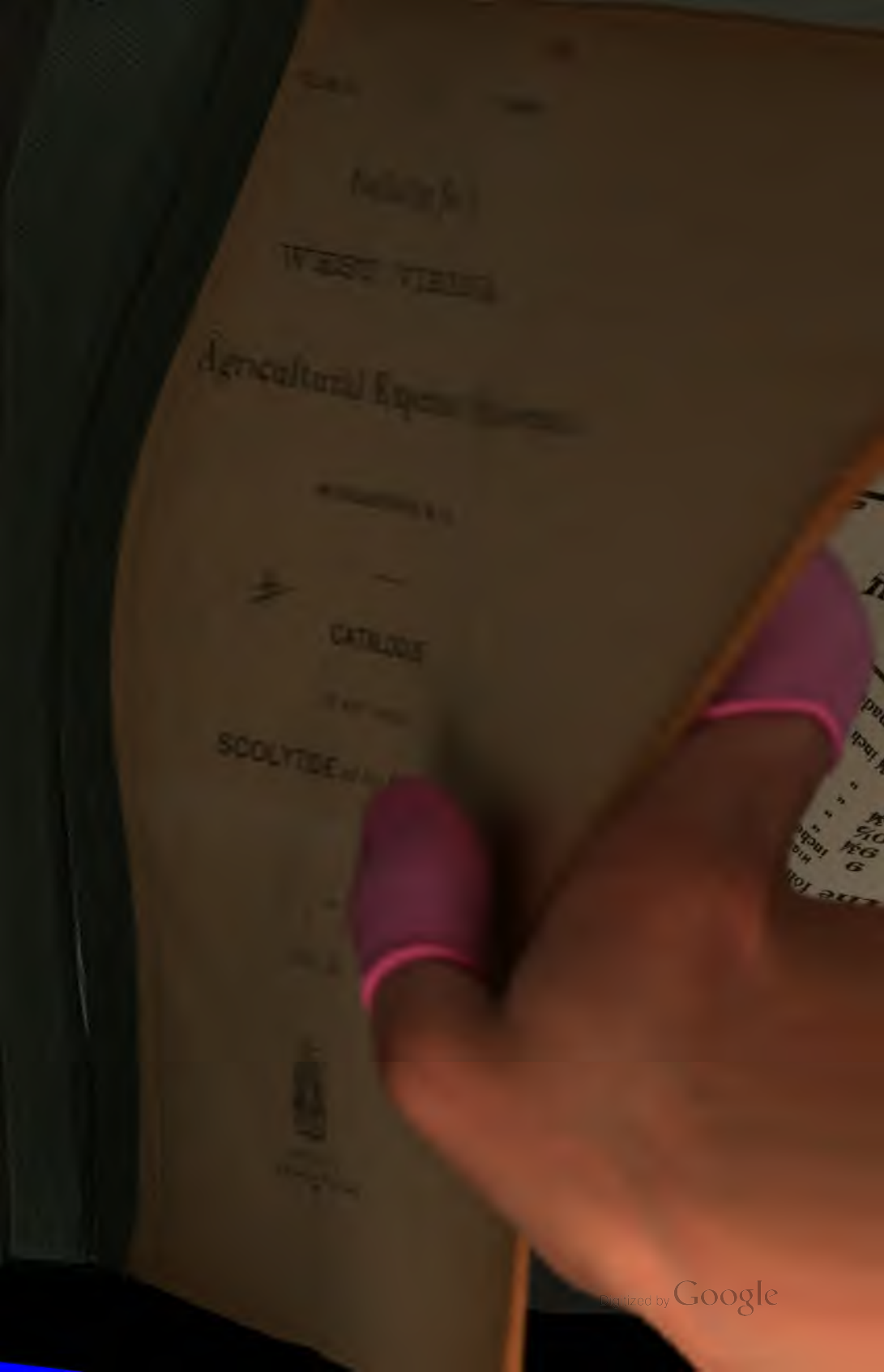

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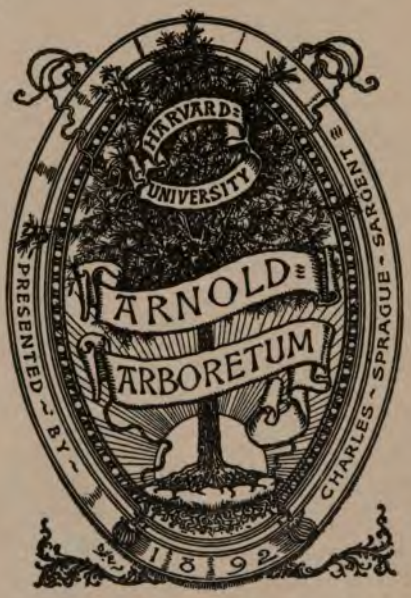

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WEST VIRGINIA

Agricultural Experiment Station

MORGANTOWN, W. VA.

CATALOGUE

OF WEST VIRGINIA

SCOLYTIDÆ and their ENEMIES.

APRIL, 1893.

CHARLESTON, W. VA.
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CATALOGUE

OF

WEST VIRGINIA SCOLYTIDÆ and their ENEMIES.

With List of Trees and Shrubs Attacked.

By A. D. Hopkins.

INTRODUCTORY.

Damage Caused by Bark and Timber Beetles.

The immense damage to forest, shade and fruit tree caused by Bark and Timber Beetles belonging to the Scolytidæ family, together with the importance of the timber and fruit interests of West Virginia has made it seem necessary that we should study the habits of the different species found, and the extent and character of the damage caused by them. While only a portion of my time has been devoted to this study, sufficient evidence has been obtained to convince me that the destructive powers of these minute and apparently insignificant beetles are far greater than is generally supposed. Owing to their obscure habits and the great labor and difficulty of collecting and studying them, comparatively little has been known of the life histories of even the commonest kinds. Therefore, it is our desire to call the attention of owners of timber, and others who are interested in the preservation of our forests, to the great importance of a more extended knowledge of the number of species and the peculiar habits of each. Especially is a more general and technical knowledge necessary that some successful efforts may be made towards preventing the recurrence of widespread devastation of timber like that which has occurred in different sections of the country within the last fifteen years.

Since 1878, vast areas of timber in the spruce forests of Maine, New Hampshire, New York, New Brunswick and Canada, have died and become almost a total loss.* In West Virginia since 1880, the Black Spruce on more than one hundred thousand acres of land has died, causing the loss of at least one million dollars. Since 1888, an unprecedented death of trees has occurred among the dif-

*Packard, Fifth Reportof the U. S. Entomological Commission. Chapter XVI. Page 811.

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ferent kinds of Pine over an area of ten thousand square miles in West Virginia, Virginia and Maryland. Our magnificent Black Spruce forests, covering an area of over five hundred thousand acres, is again threatened, and if not checked will prove destructive to large areas of timber.

From my own observation during extended investigations in the West Virginia forests and from what I have seen of the habits of certain European species, and from information obtained from Oberforester W. Eichhoff and other high authorities on the subject in Germany, I am confident much, if not all, of the destruction of timber mentioned above has been due primarily to the attack of certain species of bark beetles.

Number of Species in the Family Scolytidæ.

According to Henshaw's lists and supplements of 1889, this family includes 169 described species. Numerous new species have since been discovered, until at present there are probably over 200 described and undescribed species in the different collections. The species taken by me in West Virginia since 1890 number 53 named and 27 unnamed and new species. These I have divided into three popular groups according to certain peculiar habits of the adult insect; namely: Bark-beetles, Timber-beetles and Twig-beetles.

Habits of Bark Beetles.

As a rule, the adults of this group of Scolytids prefer to enter the green or partly dead bark on unhealthy, injured or dying trees, stumps, logs and tops of broken branches for the purpose of making mines or galleries through the inner bark, in which to deposit their eggs. The minute white grub hatching from these eggs at once commence to feed upon the bark and usually proceed at right angles from the primary gallery and extend their mines through the bark until they have become full grown, when they form pupæ cases either in the outer sap-wood, inner or outer bark, according to the habits of the species. In due time the pupæ change to adults like the parent form, and each individual makes for itself an exit through the outer bark; thus the bark of a tree infested by bark beetles will be found pierced with innumerable round holes after the young beetles have fully developed and emerged.

The number of broods of bark-beetles vary from one to three according to the species and the favorable or unfavorable conditions for their propagation. They pass the winter in different stages. Some in the larval and pupal forms in the outer sap-wood or in the bark; others, as adults, concealed in the outer bark of living or dead trees. In this group, thirty-nine species have been found belonging to the genera *Pityophthorus*, *Dryocoetes*, *Tomicus Scolytus*, *Chramesus*, *Polygraphus*, *Phloeotribus*, *Hylesinus*, *Phloeosinus*, *Dendroctonus* and *Crypturgus*.

While the majority of bark-beetles observed seem to prefer

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to attack unhealthy, injured or fallen trees, there is at least one species (77) which seems to prefer attacking living, vigorous trees, and there are others which are capable of existing in perfectly green bark without being seriously inconvenienced by the flowing sap or turpentine. When they attack the bark of a living tree, their egg galleries and larval mines through the inner bark have the effect of checking the flow of sap, thus causing an unhealthy condition of the tree. Other species having a preference for trees in this condition are attracted to it and enter the bark to extend their winding galleries and the death of the tree is the certain result. In fact, many trees might resist the first attack sufficiently to recover and other trees having their health impaired from other causes might regain their original vigor, were it not for the bark-beetles which are ever ready to infest such trees and counteract all chances of recovery.

Habits of Timber-Beetles.

Timber-beetles like the bark-beetles prefer, as a rule, to attack trees impaired in health, or those which have been recently felled, yet there are species in this group which seem to prefer to attack living trees. So far as I have observed, they all have a decided preference for green or partly green wood in which to extend their "pin-hole" tunnels. These tunnels or galleries are made by the parent beetles for the purpose of forming proper receptacles for their eggs and favorable conditions for the future development of their young.

One class of this group consists of species belonging to the genus *Monarthrum*, *Gnathotrichus* and *Xyloterus*, according to my observation, deposit ther eggs in small excavations at more or less regular intervals along the sides of the galleries. These cavities are just large enough to accommodate a single egg, and the grubs or larvæ hatching from them proceed to enlarge and extend the cavity at right angles to the primary gallery. These side cavities or chambers are only enlarged sufficiently to accommodate the full-grown larvæ, pupæ and young beetles. When the young beetles have sufficiently matured, they come out of the side chambers into the main gallery, and the entire brood emerge from the original entrace made by the parent beetle.

Another class of this group consisting of species belonging to the genus *Xyleborus*, bore into the wood in the same manner as those just mentioned, but instead of depositing their eggs in cavities in the side of the galleries, they place them in groups within its walls. The young larvæ as a rule do not enlarge and extend the gallaries, but appear to feed upon a substance coming from the wood. Frequently eggs, larvæ of all stages, pupæ, young and fully matured beetles will be found together in one gallery. It also appears that the beetles do not necessarily emerge from the wood when matured, but may extend secondary and branching galleries in which they deposit eggs for another brood. One peculiarity observed with certain species of this class is the extreme small size of

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the males which are seldom, if ever, found outside of the galleries in which they have developed.

There is another class consisting of species belonging to the genus *Platypus* which seems to partake of the habits of both of the classes mentioned above, for I have observed all stages from eggs to fully matured forms in the same mine, and I have also found the full-grown larvæ in side chambers evidently excavated by them.

The character of damage caused by all of the species of the timber beetles is principally that resulting from their boring through the green wood of saw-logs and standing trees. The round, black holes so common in lumber and timber termed "pin-holes" or "worm holes," while not all caused by Scolytids, they are to blame for certain kinds which render timber and lumber unmerchantable The discoloration of wood termed "bluing" is also largely the result of the galleries formed by the beetles in the green wood. The vacated galleries allowing air, water, and fungus germs to penetrate the wood of trees, logs, manufactured timber and lumber, not only cause the blue or colored condition, but a rapid decay of the wood. Twenty-five species belonging to this group have been observed.

Habits of Twig-Beetles.

The beetles belonging to this group attack the terminal twigs and small branches of living, dying and dead trees, in which they form galleries for the purpose of depositing eggs; and the larvæ feed upon the bark and wood. Species having this habit so far as I have observed belong to the genera *Hypothenemus* and *Pityophthorus*. Fifteen species belonging to this group have been observed.

The Clover Root-Beetle

Is a species belonging to the Scolytid family which may properly be called a root beetle to distinguish it from those having different habits. I have not yet met with this species in our State, but from the fact that it is a common clover pest in adjoining States, it will doubtless be found within our borders.

Special Investigations.

The destructive work of three species of Scolytids namely the Destructive Pine Bark Beetle (*Dendroctonus frontalis*), the Spruce Bark-beetle (*Polygraphus rufipennis*), and European Fruit Bark-beetle (*Scolytus rugulosus*), has demanded special investigation requiring long and difficult journies through the extensive forests, wild mountain regions, and other sections of the State. I have availed myself of the opportunity thus offered to not only study the habits of these destructive species, but to also collect and study other members of the family to which they belong. Many interesting facts relationg to the family and their natural enemies have been discovered and some important experiments are now under way to ascer-

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tain the efficiency of certain methods of combatting the most pernicious kinds; one of which is the importation of enemies of European Scolytids to feed upon and reduce the numbers of the destructive American species.

These investigations and experiments are not yet sufficiently completed to justify the publication of a detailed report of the work and results. Therefore this catalogue of species observed, and summary of notes relating to their life history is sent out in advance of popular bulletins on forest and shade tree insects, which will contain full accounts and illustrations of the principal injurious and beneficial species and detailed reports of the investigations. It is also intended to serve in part as a catalogue of an exhibit collection of Scolytids and some of their enemies to be shown in the station exhibit by the Association of American Agricultural Colleges and Experiment Station at the World's Columbian Exposition at Chicago.

The Exhibit Collection.

Aside from showing the results of some special work in Entomology by the West Virginia Agricultural Experiment Station, the exhibit referred to is intended to illustrate as far as possible the character of the damage caused by Bark and Timber Beetles, and the individual species to blame for certain kinds of "pin-holes" in wood, certain kinds of mines or galleries in the bark and other peculiar damage to timber and lumber, such as "bluing" and premature decay, due to their boring in the green wood, and also to show some of the native and imported enemies which are being studied with a view of utilizing them in the destruction of the injurious Scolytids.

All of the species mentioned in this catalogue could not be shown in this exhibit on account of insufficient material for both it and the exhibit collection of forest and shade tree insects, to be shown with the forestry exhibit in the West Virginia building. It will also be understood that uniques and type specimens are too valuable to place in an exhibit collection.

The List of Insects.

All of the species mentioned in this catalogue have either been collected or bred by me since March, 1890, and the condensed reference to habits, collecting and breeding dates, localities, etc., are taken from my notes and records of observation.

The arrangement of the species of Coleoptera are according to Henshaw's list and supplements of 1889, without regard to changes which have been made since his list was issued. The Hymenoptera are arranged in families as near as could be according to Cresson's synopsis of 1887.

Where the species of Coleoptera and Hymenoptera are simply named generically, they are believed to be new species. If, upon further study, this is found to be a fact, they will be described and their names published in a subsequent list.

Where a species of predacious or parasitic insects is mentioned as being found with a species of Scolytid, it means that they were

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found in the mines or galleries of the Scolytids, but no further evidence was had that they actually attack them. Where the word attack is used, I have evidence that they are actually enemies of the species mentioned in connection with them.

List of Trees and Shrubs.

The technical names of the trees and shrubs from which I have taken Scolytids has been made out and arranged by my assistant, Mr. W. E. Rumsey, from their common names as mentioned in my notes. Mr. Rumsey has also rendered efficient assistance in the preparation of specimens of the exhibit.

Acknowledgements.

For the first determination of the largest number of the species of Scolytids mentioned, I am under special obligations to Oberforester W. Eichhoff, of Strassburg, Germany, who is probably the best authority in the world on the systematic study of this family.

For the determination of Hymenoptera, I am under obligations to Dr. C. V. Riley, Messrs. L. O. Howard and William H. Ashmead, of the Division of Entomology at Washington.

For the first determination of Coleopterous enemies, I am indebted to Dr. G. H. Horn, of Philadelphia, and to Dr. C V. Riley, of Washington.

For the naming and description of new species of Braconidæ, I am under special obligations to Mr. William H. Ashmead, of Washington.

I desire in this connection to mention the special kindness of the following named persons during my recent visit to Germany for the purpose of collecting and studying the enemies of European Scolytidæ: Mr. W. Eichhoff, of Strassburg, in giving valuable information and assistance by letters of introduction and otherwise during my investigations in the Alsacian and Lorraine forests. Oberforester Strohmeyer and his son, Mr. H. Strohmeyer, of Hagenau, Elsace, and Oberforester Pilz, of Albansweeler Lorraine, in accompanying me and giving special privileges in the forests of which they have charge.

During my stay in the Kingdom of Saxony, Mr. Camillo F. Schaufuss, Director of the Museum at Meissen, was specially kind in giving efficient aid in our search for the European Bark Beetle Destroyer,* in the King's forest near Moritzburg.

Through the kindness of the Curators of the Kensington Museum at London, the Museum d'Histoire Naturelle, at Paris, and the Museum at Berne, I was permitted to examine the study collections of Scolytids. I also availed myself of the opportunity of looking over Mr. Eichhoff's elegant collection of Scolytids of the World, in which many type specimens of American species were found.

*This popular name was given to Clerus formicarius by Mr. Schaufuss and myself while we were taking refreshments at a cafe in the Grasse Garten in Dresden, September 2. It was so named on account of the recognized predaceous habits of both the adults and larvae.

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WEST VIRGINIA SCOLYTIDÆ

Collected and Bred March, 1890, to March, 1893.

Order COLEOPTERA; Family SCOLYTIDÆ.

1.* **Platypus quadridentatus**, Oliv.

TIMBER BEETLE.†

Enters green sap-wood near base of dying trees. Causes "pin-holes," hastens decay. Infests Black Oak, Chestnut.
Enemies 128? 129?‡

Adults July 29, 30.
Wayne and Wood counties.§

2. **Platypus compositus**, Say.

TIMBER BEETLE

Enters green sap and heart wood. Causes "pin-holes" in wood, hastens decay. Infests Black Oak, Sugar Maple, Chestnut, Basswood, Magnolia, Red Elm, Beech, Wild Cherry.
Enemies 139.

Adults June 12; July 17, 21, 22, 29; August 4, 10; October 15; January 31. Pupæ July 21, 22. Larvæ July 21, 22; January 31. Eggs July 22; August 10.
Counties, Tyler, Kanawha, Wetzel, Monongalia and Wood.

3. **Corthylus punctatissimus**, Zimm.

TIMBER BEETLE.

Enters wood of green trees, causes the death of small trees. Infests sassafras.

Adult Oct. 14.
Monongalia county.

*Numbers in heavy type indicate that the specimen is shown in Exhibit collection.
†See page 123.
‡Refer to numbers in this list.
§Localities where collected.

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8. **Pityophthorus minutissimus**, Zimm.

BARK BEETLE.*

Enters green and dead bark on injured and dead branches and tops of trees. Causes slight, if any, damage. Infests Black Oak, White Oak, Jack Oak, Chestnut Oak, Dogwood.
Enemy 114.

Adults June 13; July 29; December 24; January 27. Pupæ July 29. Larvæ July 29; February 12. Eggs July 29.
Wood and Monongalia Counties.

9. **Pityophthorus sp. a.**

BARK BEETLE.

Enters green bark of tops and branches injured or broken by storm. Hastens death of top and branches attacked. Infests White and other Pines.

Adults April 30.
Wood county.

10. **Pityophthorus pullus**, Zimm.

BARK BEETLE.

Mines under partly green bark on dying trees, branches and tops. Hastens death of trees? Infests Pines.
Enemies 149, 151.

Adults April 30; May 3, 4, 6, 9, 20, 30; September 5, 12. Pupæ May 30. Larvæ May 30.
Hampshire, Hardy, Wood and Monongalia counties.

11. **Pityophthorus, sp. b.**

BARK BEETLE.

Habits unknown. Collected on bark of dead Maple.

Adult May 27.
Monongalia county.

11a. **Pityophthorus plagiatus**, Lec.
Tomicus plagiatus, Lec. (A. D. H.)

BARK BEETLE.

Mines under green bark on tops and branches of injured and dying trees, broken branches, etc. Hastens death of injured trees. Infests Pines.
Enemies, 101.

Adults, May 3, 6, 18; October 10, 14.
Wood, Hampshire and Monongalia counties.

*See page 122.

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12. **Pityophthorus sparsus**, Lec.
Tomicus sparsus, Lec. (A. D. H.)

BARK BEETLE.

Mines in green bark on tops of injured and dying trees, broken branches, etc. Hastens death of trees. Infests White Pine, also other Pines.

Adults, April 30; May 9; September 12. Papæ September 12
Eggs April 30. Adults emerged July 1.
Wood county.

13. **Pityophthorus cariniceps**? Lec.

TWIG BEETLE.

Mining under bark and in wood of terminal twigs of young dying spruce. Damage unknown. Infests Black Spruce.

Adults, August 29.
Randolph county.

14. **Pityophthorus confinis**, Lec.

BARK BEETLE.

Mining in outer and inner bark on dead trees, and under green bark on injured trees Probably hastens death of trees. Infests Pines.
Enemy, 156.

Adults April 30; May 4, 6, 20; June 21, 24; July 13. Larvæ, Pupæ and adults October 14.
Wood, Hampshire and Monongalia counties.

15. **Pityophthorus consimilus**, Lec.

BARK BEETLE.

Mines under green bark on dying trees and injured shrubs or vines. Hastens death of shrubs. Infests Sumach, all of the species of the genus Rhus.
Enemy 155.

Adults June 27; July 22; August 4; November 8; October 15.
Pupæ June 27; October 15. Larvæ June 27; October 15; December 7.
Wood, Kanawha, Tyler, Marion and Monongalia counties.

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16 **Pityophthorus hirticeps**? Lec.
(= ? *new species.* A. D. H.)

TWIG BEETLE?

Mines under bark and in wood of terminal twigs on young trees. Damage unknown. Infests Black Spruce.

Adults August 29.
Randolph connty.

17. **Pityophthorus sp. c.**

BARK BEETRE?

In bark of dying trees. Damage unknown. Infests Black Spruce. Enemy 94.

Adults June 23; August 29.
Randolph and Pendleton counties.

18. **Pityophthorus lautus,** Eich.

BARK BEETLE.

Mining under bark on injured branches and twigs. Damage unknown. Infests Pine.

Adults June 29; July 30. Larvæ July 30.
Wood county.

19 **Pityophthorus puberulus**, Lec.

BARK BEETLE.

Mining under bark on dead trees. Damage unknown. Infests Pine. Enemy 151.

Adults July 20.
Marshall county.

20. **Pityophthorus sp. d.**

TWIG BEETLE.

Mining in bark and wood of dying twigs on green trees. Seems to cause the death of the twigs. Infests Pines.
Enemies 83? 151.

Adults May 3; June 29; July 13, 30. Bred—Eggs May 3. Larvæ, Pupæ and Adults July 13. Larvæ July 13, 30.
Hampshire and Wood counties.

21. **Pityophthorus sp. e.**

TWIG BEETLE.

Mining in bark and wood of dying twigs on healthy trees. Probably kills twigs. Infests Pine.

Adults, Pupæ and Larvæ June 29.
Wood county.

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22. **Pityophthorus tuburculatus**, Eich.*

BARK BEETLE.

Mining under bark of terminal twigs on young trees. Infests Black Spruce.

Adult bred Oct. 28.
Randolph county.

23. **Pityophthorus sp. f.**

TWIG BEETLE.

Infests Pine twigs.

Adults June 29.
Wood county.

24. **Pityophthorus sp. g.**

BARK BEETLE.

Mining under green bark on injured tops and branches. May hasten death of injured trees. Infests White Pine, also other Pines.

Adults April 30.
Wood county.

25 **Pityophthorus sp. h.**

BARK BEETLE.

Mining under bark on dead branches. Infests Apple.

Adults Dec. 4.
Monongalia county.

26. **Hypothenemus eruditus**, Westw.

TWIG BEETLE.

Mines in pith and wood of dead twigs and vines. Infests Honeysuckle.

Adults bred March 18.
Wood county.

27. **Hypothenemus sp. a.**

TWIG BEETLE.

Mining under bark on small dead branches. Infests Apple.

Adults Dec. 4; Oct. 23.
Monongalia county.

28. Hypothenemus sp. b.

TWIG BEETLE.

Mining in outer end of twigs on dead trees. Infests White Walnut, Black Walnut.
Enemy 116.

Adults Mar. 3; April 24. Bred April 25. May 30. Eggs May 30.
Monongalia county.

*So determined by Mr. Eichhoff.

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29. **Hypothenemus sp. c.**

TWIG BEETLE.

Mining in buds and ends of twigs of cut branches. Infests Apple.

Adults December 4.
Monongalia county.

30. **Hypothenemus erectus**, Lec.

TWIG BEETLE.

Mining in pith and wood of vine. Infests Honeysuckle.

Adult bred April 19. Pupæ March.
Wood county.

31. **Hypothenemus sp d**

TWIG BEETLE.

Mining in bark and wood of dying twigs on healthy trees. Infests Pine. (P. inops.)

Adults June 29.
Wood county.

32. **Hypothenemus dissimilis**, Zimm.

TWIG BEETLE.

Mining in pith and wood of dead twigs. Infests Hickory.

Adults October 15.
Marion county.

33. **Hypothenemus sp. e**

TWIG BEETLE.

Mining in pith and wood of twigs killed by twig girdler *Oncideres cingulata*. Infests Hickory.

Adults Oct. 15.
Marion county.

34. **Hypothenemus sp. f.**

TWIG BEETLE.

Bred from galls on oak twigs.

Adults Oct. 10.
Jefferson county.

35. **Hypothenemus sp. g.**

TWIG BEETLE.

Mining in twigs killed by oak pruner (*Elaphidion parallelum*?) Infests White Oak.

Adult Dec. 24.
Wood county.

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36. Xyloterus retusus, Lec.

TIMBER BEETLE.

Enters green sap-wood of dying trees. Causes large pin holes. Hastens decay. Infests Large-toothed Aspen.

Adults Aug. 10.
Monongalia county.

37. Xyloterus bivittatus, Kirby.

TIMBER BEETLE.

Enters green sap wood of logs, stumps and dying trees. Causes great damage to saw logs. Produces pin holes. Causes "bluing" and hastens decay. Infests Black Spruce and Hemlock.
Enemies 138, 139 ?, 154 ?.

Adults May 8, 9; June 1; July 7, 8, 9, 11; August 30; September 1. Pupæ June 1; July 9. Larvæ June 1; July 9, 11. Eggs May 8, 9.
Tucker, Grant and Randolph counties.

38. Xyloterus scabricollis, Lec.

TIMBER BEETLE.

Enters green sap wood of dying pine trees. Causes "pin holes," "bluing" and hastens decay. Infests Pines.

Adults May 3, 4.
Hardy and Pendleton counties.

39. Xyloterus politus, Say.
(*Xyloterus unicolor*, Eich.)

TIMBER BEETLE.

Enters green wood of logs, stumps, dying-trees and wounded places on green trees. Causes black "pin holes" in wood. Very injurious to outer portion of wood. Hastens decay. Colors the wood. Infests Beech, Black Oak, White Oak, Red Oak, Hemlock, Sugar Maple, Red Maple, Chestnut, Magnolia, Elm, Hickory, Ash, White Birch, Black Spruce.
Enemies 128, 140 ?.

Adults March 29, 30; April 12, 17, 29, 30; May 8, 9; June 1; July 10, 16, 24, 26, 29, 30; August 10. Eggs July 17. Adults emerging July 24.
Wood, Grant, Tucker, Hancock, Tyler, Wayne and Monongalia counties.

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40. **Cryphalus n. sp.**, (Eich.)

Flying.

Adult April 15.
Wood county.

41. **Xyleborus pyri**, Peck.

TIMBER BEETLE

Enters green sap and heart wood of logs, stumps, injured and living trees. Causes black "pin holes," a serious damage to lumber. Infest Hemlock, Beech, Birch and Red Oak.

Adults May 8, 9. Larvæ June 1. Eggs May 8, 9.
Grant county.

42. **Xyleborus sp. a.**

TIMBER BEETLE.

Enters wood of stumps. Causes black "pin holes." Infests Cedar.

Dead adult January 31.
Monongalia county.

43. **Xyleborus obesus**, Lec.

TIMBER BEETLE.

Enters green wood of logs. Causes large black "pin holes." Probably causes considerable damage to oak timber and lumber. Infests Black Oak, Beech and Hemlock.

Adult March 3; July 6, 8. Pupæ and larvæ July 6, 8.
Preston, Grant and Monongalia counties.

44. **Xyleborus celsus**, Eich.

TIMBER BEETLE.

Enters wood of logs and dying trees. Infests Hickory.
Enemy 160?

Adults April 30; May 20.
Wood county.

45. **Xyleborus fuscatus**, Eich.

TIMBER BEETLE.

Enters green wood near base of stumps and dying trees. Causes "pin holes." Hastens death of tree. Infests Black Oak and Hickory.
Enemy 163?

Adults July 10, 24, 29, 30.
Wayne, Grant, Wood and Monongalia counties.

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46. **Xyleborus, sp. b.**

TIMBER BEETLE.

Enters green sap wood near base of dying trees and stumps. Causes numerous black "pin holes." Hastens decay. Infests White Oak, Chestnut Oak, Black Oak, Jack Oak. Enemy 165?

Adults July 7. 30; Jan. 27.
Wayne, Wood and Monongalia counties.

47. **Xleborus sp. c.**

TIMBER BEETLE.

Enters green wood at base of injured trees. Causes "pin holes." Hastens decay. Infests Jack Oak.

Adult July 29.
Wood county.

48. **Xyleborus sp. d.**

TIMBER BEETLE.

Enters green sap wood near base of dying trees. Causes numerous small "pin holes" in wood. Infests Black Oak, Hickory and Chestnut.

Adult July 10, 29; Sep. 3; Oct. 10.
Monongalia, Wayne, Grant and Marion counties.

49. **Xyleborus xylographus,** Say.
(*Xyleborus Saxesenii*, Ratz.)

TIMBER BEETLE.

Enters green wood on felled trees and injured or dying wood on green trees. Probably hastens death of injured trees. Infests Apple.

Adults, Pupæ, Larvæ, Eggs October 11; December 4, 6; March 2.
Manongalia county.

50. **Xyleborus, sp. e.**

TIMBER BEETLE?

Adult flying April 14.
Wood county.

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51. Xyleborus pubescens, Zimm.

TIBBER BEETLE.

Enters green sap and heart wood of stumps, logs and dying trees. Causes numerous black "pin-holes." Hastens death of trees. Infests White Oak, Chestnut, Black Oak, Buckeye, Magnolia, Basswood, Cultivated Cherry, Honey Locust, Jack Oak.

Enemy 163.

Adults April 14, 18, 27; May 4, 20; September 3; Adult, Pupæ, Larvæ, Eggs July 21, 29.
Wood, Wetzel and Monongalia counties.

52. Xyleborus, sp. f.

TIMBER BEETLE.

Enters green sap wood at base of dying trees. Causes "pin holes," "bluing." Hastens decay. Infests Pine.

Adults, Pupæ, Larvæ July 24.
Monongalia county.

53. Xyleborus, sp. g.

TIMBER BEETLE?

Adults Flying.
Wood county.

54. Dryocoetes autographus, Ratz.
(*Dryocoetes septentrionis*, Mann.)

BARK BEETLE.

Mines under green bark on logs, stumps and dying trees. Hastens death of injured trees. Infests Black Spruce. Norway Spruce.

Enemies 86, 87, 90, 124? 131?

Adults March 15, 26, 28, 29, 30, 31; May 8; June 18, 20. Pupæ August 29. Larvæ March 31; July 11; August 29, 30; September 1. Eggs July 11; September 1.
Randolph, Monongalia, Tucker and Grant counties.

55. Dryocoetes, n. sp.

BARK BEETLE.

Mines under green bark on stumps, logs and dying trees. Hastens death of trees. Infests White and Black Birch, Wild Cherry.

Enemies 124? 142?

Adults May 8, 9; July 7, 9. Larvæ May 8, 9. Eggs July 7, 9.
Grant county.

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56. **Dryocoetes affaber?** Mann.

BARK BEETLE.

Mining under bark on dead trees. Infests Black Spruce

Adult July 9.
Grant county.

57. Dryocoetes granicollis, Lec.

BARK BEETLE.

Mining under green bark on stumps logs, and dying trees. Hastens death of trees Infests Black Spruce.

Adults March 29; May 9; June 1, 24; July 9, 11; August 28, 29; September 1. Pupæ August 29. Larvæ September 1.
Randolph, Tucker and Grant counties.

58. Tomicus calligraphus, Germ.

BARK BEETLE.

Mining under green bark on stumps, logs, injured and dying trees. Hastens death of trees and may cause their death. Infests all of the Pines.

Enemies 105, 132? 136? 143? 151.

Adults May 3, 5, 8, 15; June 23, 24; July 13, 27; October 2, 15, 19, 22; November 6. Pupæ June 23; July 13; October 19. Larvæ June 23; July 13. November 6. Eggs May 3, 8; August 10. Adults mining in outer sap-wood October 15.
Wood, Hampshire, Pocahontas, Pendleton, Monongalia, Hardy and Wirt counties.

59. Tomicus cacographus, Lec.

BARK BEETLE.

Mining under green bark of logs, stumps, injured and dying trees. Hastens death of injured trees. May cause the death of trees. Infests all the Pines, Black Spruce, Norway Spruce.

Enemies 88, 89, 105, 131?, 132? 135?, 144?, 149, 151, 155, 161.

Adults April 1; May 3, 8, 9, 15, 18, 20, 23; June 13, 14, 23, 24, 29; July 9, 13, 14, 24, 28; August 12, 29. Pupæ June 13, 14, 23, 24, 29; August 29; November 7. Larvæ May 18; June 13, 23, 24; July 28; November 7. Eggs May 3, 8, 9; July 13, 20, 28. Adults emerging from bark July 14; November 7. Mining in outer sap-wood August 12.
Wood, Hardy, Marion, Monongalia, Grant, Hampshire, Pendleton and Randolph counties.

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60. Tomicus pini. Say.

BARK BEETLE.

Mining under green bark of logs, stumps, injured and dying trees. Hastens death of trees. Infests all of the pines. Norway Spruce.
Enemies 105, 121?, 125?, 159, 161.

Adults May 3, 4, 30; July 14, 20, 27; November 7. Pupæ July 20, 27. Larvæ May 3, 30; November 7. Eggs May 3.

Hardy, Wetzel, Marshall, Pocahontas, Hampshire, Pendleton and Monongalia counties.

61. Tomicus avulsus, Eich.

BARK BEETLE.

Mines under green bark and in outer sap-wood of logs, stumps and dying trees. Hastens death of trees. Infests White and other Pines.
Enemy 156.

Adults May 4, 6, 8; June 23. Eggs May 8.

Wood, Hampshire and Pendleton counties.

62. Tomicus cælatus, Eich.
(*Xyleborus cælatus, Eich.*)

BARK BEETLE

Mines under green bark on logs, stumps, living and dying trees. Hastens death of trees. Infests all of the pines, Black, Spruce, Norway Spruce.
Enemies 107, 121?.

Adults March 15; April 30; May 3, 11; June 4, 12; July 1, 4, 13, 20, 24, 27; September 1, 30; October 14, 17, November 13. Pupæ July 13, 21. Larvæ May 18; July 13, 21. Eggs April 30; May 1.

Adults emerged July 1. Eggs June 12; July 21.

Monongalia, Wirt, Wood, Wetzel, Marshall, Hampshire, Randolph counties.

63. **Tomicus plagiatus,** Lec. Equals 11a this list.

64. Scolytus quadri spinosis, Say.

HICKORY BARK BEETLE.

Mining under green bark on logs, stumps and dying trees. Infests Hickory.
Enemies 85, 92, 158.

Adults July 22; August 10. Pupæ April 29, 30. Larvæ July 22, 24, 29, 30; August 10; November 7. Eggs July 24; August 10.

Tyler, Wood and Monongalia counties.

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65. Scolytus muticus, Say.

HACKBERRY BARK BEETLE.

Mines in bark and wood of felled and dead trees, dead branches on living trees. Hastens decay of wood. May hasten death of idjured trees. Infests Hackberry.
Enemies 91?, 95?.

Adults emerged May 2. Larvæ full grown October 23; February 28.
Wood and Monongalia counties.

66. Scolytus rugulosus, Ratz.

EUROPEAN FRUIT BARK BEETLE.

Mines under green bark of injured dying and living trees, cut and broken branches. Hastens death of trees. May be the primary cause of death of trees. Infests Apple, Cultivated Cherry, Plum, Peach, Pear and Quince.
Enemies 81, 97, 98, 99, 100, 108, 110, 142, 146?, 153, 155, 157a, 158, 166?.

Adults April 15, 17, 29; May 8, 19; June 16, 17, 20, 21, 22, 24, 25, 26, 29; July 1, 20, 24, 25, 26, 30, 31; August 12, 13, 29; September 7. Pupæ January 1, 17; April 17; June 1; July 20; August 22. Larvæ January 1, 17; April 17; June 1, 20, 22, 25; July 20; August 22; October 23; December 24. Eggs June 16, 17, 21, 22, 25; July 26; August 29; September 27. Observed adults emerging June 1, 22; July 26; August 22. Observed adults copulating September 7; October 5.
Monongalia, Wood, Cabell, Tyler, Harrison, Marshall counties.

67. Chramesus icoriæ, Lec.

BARK BEETLE.

Mining under partly green bark on cut branches and tops of dying trees. Infests Hickory.
Enemies 147?, 161.

Adults April 23, 29; June 24, 25; October 15.
Wood and Marion counties.

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68. Polygraphus rufipennis, Kirby.

SPRUCE BARK BEETLE.

Mining under green bark on logs, tops, stumps, broken branchss, living, injured and dying trees. Causes death of trees. A destructive species. Infests Black Spruce. Enemies 84, 93, 96, 103, 104, 112, 113. 115?, 121?, 122?, 123?, 133?, 134?, 137?, 150, 151. 155, 157, 161, 162, 164.

Adults March 26, 28, 31; May 8, 9, 12, 30; June 4, 21, 22, 23; July 7, 8, 11, 12; August 12, 29, 30; September 1, 2, 14; October 22, 28; November 31. Pupæ May 30. Larvæ March 26, 29, 31; June 23; July 9, 12; September 1. Eggs May 9; June 23; July 8, 9. Adults developed from eggs between May 12 and July 22.

Randolph, Grant, Tucker, Pendleton and Monongalia counties.

69. Phlœotribus liminaris, Harr.

BARK BEETLE.

Mining under green bark on living, injured and dying trees, broken branches, logs, stumps, etc. Hastens death of trees. May prove a troublesome pest. Infests peach, cultivated cherry, wild cherry. Adults hibernate in outer bark of living trees. Enemy 157*a*.

Adults April 3, 17; May 11, 15, 30; July 13, 20, 24; November 26; February 7. Pupæ July 13, 24. Larvæ July 13, 24. Eggs May 30; July 13.

Wood, Marshall and Monongalia counties.

70. **Phlœotribus sp. a.**

BARK BEETLE?

Adult flying May 18.

Wood county.

71. **Phlœotribus, sp. b.**

BARK BEETLE.

Under bark on dead trees. Infests Red Cedar.

Adult October 22.

Marion county.

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72. Phlœotribus, frontalis, Oliv.

BARK BEETLE.

Mining under green bark on living, injured and dying trees, and broken branches. Hastens death of trees. Infests Mulberry.
Adults hibernate in outer bark on living trees.
Enemy 145?.

Adults April 9, 23; June 24; July 20, 29; December 4. Pupæ June 24; December 4. Larvæ June 24; December 4.
Wayne, Wetzel and Monongalia counties.

73. Hylesinus aculeatus, Say.

ASH BARK BEETLE.

Mining under green bark of logs, stumps and dying trees. Hastens death of trees. Infests Ash (black).

Adults June 20; July 24; August 10. Pupæ June 20; July 24. Larvæ June 20; July 24; August 10. Eggs June 20.
Monongalia, Randolph and Tucker counties.

74. Hylesinus opaculus, Lec.

ELM BARK BEETLE.

Mining under green bark on logs, stumps, dying trees and broken branches. Hastens death of trees. Infests Elm.
Enemy 151.

Adults July 6, 21; August 4, 10 Pupæ July 21. Larvæ July 21; August 4.
Wetzel, Hancock and Kanawha counties.

75. Phlœosinus dentatus, Say.

CEDAR BARK BEETLE.

Mining under green bark on logs, stumps, tops of injured and dying trees and broken branches. Hastens death of trees. Beneficial in separating bark from posts, thus preventing decay of sap-wood. Infests Red Cedar.
Enemies 88, 102, 109, 148, 149.

Adults April 29; May 4, 8, 20, 23; June 1, 9, 14, 18, 24, 25; July 4; August 1, 5; October 8; November 8. Pupæ June 1, 18; August 5, 8. Larvæ May 23; June 1; November 8; August 5. Eggs April 29; May 4, 8. Bred: first eggs May 8. Larvæ full grown June 1. Adults emerged June 9. Second brood eggs July 15 to 18. Pupæ August 5.
Wood, Grant, Monongalia and Hampshire counties.

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76. Dendroctonus terebrans, Oliv.

BARK BEETLE.

Mining in green bark and turpentine on living and dying trees, logs, and stumps. Hastens death of trees. May be primary cause of death of trees. Infests all of the pines.

Adults May 3, 4, 5; June 23; July 13, 21; August 10; September 23; October 10, 14; November 8. Pupæ July 13; September 28. Larvæ June 23; July 13, 21; August 10; October 14. Eggs May 3, 4. Bred: Larvæ July 13. Adult emerged September 28.

Hampshire, Monongalia, Pendleton, Hardy, Marion and Wood counties.

77. Dendroctonus frontalis, Zimm.

THE DESTRUCTIVE PINE BARK BEETLE.

Mining under green, sappy bark on living, healthy trees. Primary cause, within four years of the death of over $1,000,000 worth of timber. Very destructive. Infests all of the pines. Black Spruce, Norway Spruce. Enemies 82, 106, 111, 121?, 151, 156, 161, 168.

Adults May 3, 4, 5, 18, 22; June 23, 24; July 11, 13, 17, 24; August 10; September 12, 29; October 10, 12, 21; November 7; December 1. Pupæ May 3, 4, 5; August 10; October 10, 21; Larvæ May 3, 4, 5, 30; July 12; August 10; October 10, 21. Eggs May 5, 20; July 24; November 7. Breeding dates: adults entered green bark May 18; young larvæ found May 30. Pupæ July 24. Larvæ collected November 7. Adults emerged December 1.

Hampshire, Hardy, Tucker, Randolph, Pendleton, Monongalia, Wood and Greenbrier counties.

78. Crypturgus pusillus, Gyll.
(*Crypturgus atomus, Lec.*)

BARK BEETLE.

Mining in bark on dying and dead trees. May hasten death of trees. Infests the pines, Black Spruce. Enemy 161.

Adults March 20, 26, 28; June 24; July 9, 13; August 30; October 1. Larvæ March 26, 28.

Wood, Tucker, Randolph, Grant, Hampshire and Monongalia counties.

79. Hylastes, sp.

BARK BEETLE.

In bark of dying pines.

Adult May 3.

Hardy county.

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80. Hylurgops glabratus, Zett.
(*Hylurgops pintfex*, Fitch.)

BARK BEETLE.

Mining under green bark at base of dying trees. Also on logs and stumps. Hastens death of trees. Infests the pines.

Adults May 3, 4, 5; June 29. Pupæ October 4. Eggs May 3, 4, 5. Bred: adults entered bark May 18, young larvæ June 13. Full grown larvæ July 14.
Wood, Hampshire, Pendleton, Grant and Monongalia counties.

ENEMIES OF SCOLYTIDÆ

Including Predaceous, Parasitic, and other Species

Found with Members of this Family.

Collected and bred March 1890 to March 1893.

Order HYMENOPTERA; Family ICHNEUMONIDÆ.

81. Hemiteles scolyti, Ashm., sp. n., MS.
With *Scolytus rugulosus* (66) In dead peach twigs.

Adults bred April 20.
Wood county.

ORDER HYMENOPTERA; FAMILY BRACONIDÆ.

82. Bracon pirsodis, Ashm.

PRIMARY PARASITE.

Attacks *Dendroctonus frontalis* (77) in pine bark.

Adults bred January 29. Cocoons November 7.
Monongalia county.

83. Rhyssalus pityophthori, Ashm., sp. n.
With *Pityophthorus sp d* (20.) In pine bark.

Adults bred July 29.
Described by William H. Ashmead, "Canadian Entomologist," XXV., page 69.
Wood county.

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84. **Spathius claripennis**, Ashm., sp. n.

PRIMARY PARASITE.

Attacks *Polygraphus rufipennis* (68) in Spruce bark.

Adults bred April 20. Cocoons March 26; Sep. 26; Nov. 31; Larvæ May 4.

Described by Wm. H. Ashmead, "Canadian Entomologist," XXV., page 72.

Tucker and Monongalia counties.

85. **Spathius unifasciatus**, Ash. n. sp.

PRIMARY PARASITE.

Attacks *Scolytus 4-spinosus* (64), Hickory Bark.

Adults bred April 29.

Described by Wm. H. Ashmead "Canadian Entomologist," XXV., page 72.

Wood county.

86. **Spathius brachyurus**, Ash. n. sp.
(87.)

PRIMARY PARASITE.

Attacks *Dryocoetes autographus* (54) in Spruce bark.

Adults bred April 6; Nov. 10. Cocoons March 15; April 6.

Described by Wm. H. Ashmead "Canadian Entomologist," Vol. XXV., page 73.

Monongalia county.

88. **Spathius Canadensis**, Ash. n. sp.

PRIMARY PARASITE.

With *Phlœosinus dentatus* (75) Red Cedar and *Tomicus cacographus* (59) in White Pine.

Adults bred May 2, 10. Cocoons March 31; April 14, 18, 23.

Wood county.

89. **Spathius pollidus**, Ash n. sp.

PRIMARY PARASITE.

Attacks *Tomicus cacographus* (59) in Pine Bark.

Adult bred June 23.

Described by Wm. H Ashmead in "Canadian Entomologist," Volume XXV., Page 74.

Wood county.

90. **Spathius tomici**, Ash. n. sp.

PRIMARY PARASITE.

Attacks *Dryocoetes autographus* (54) in Spruce bark.

Adults bred April 6; Cocoons March 15.

Monongalia county.

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91. **Spathius brunneus**, Ashm.

With *Scolytus muticus* (65) in Hackberry bark.

Adults bred. Cocoons May 2.
Kanawha county.

92. **Lysitermus scolyticida**, Ash. n. sp.

PRIMARY PARASITE.

Attacks *Scolytus 4—spinosus* (64) in Hickory bark.

Adults bred from Cocoons, April 30.
Wood county.

93. **Lysitermus sp?**

PRIMARY PARASITE.

Attacks *Tomicus plagiatus* (11*a*. 63) in Pine bark.

Adults bred. Cocoons, October 14.
Monongalia county.

94. **Cænophanes pityophthori**, Ash, n. sp.

PRIMARY PARASITE.

Attacks Pityophthorus sp. c, (17) *Polygraphus rufipennis* (68) in Spruce bark.

Adult flying May 2. Cocoons February 24. (Adults bred) Larvæ October 25. Described by Wm. H. Ashmead, "Canadian Entomologist" XXV. Page 78.
Monongalia and Wood counties.

95. **Helcon legator**, Say.

PRIMARY PARASITE.

With *Scolytus muticus* (65) in Hackberry.

Adults bred. Cocoons, May 2.
Wood county.

96. **Cosmophorus, hopkinsii** n. sp., Ash. MS.

PRIMARY PARASITE.

Attacks *Polygraphus rufipennis* (68) Larvæ in Spruce bark.

Adults flying August 29. Adults bred September 14; Oct. 25.
Randolph county.

ORDER HYMENOPTERA; FAMILY CHALCIDIDÆ.

97. **Eurytoma bicolor**, Walsh.

PRIMARY PARASITE.

Attacks *Scolytus rugulosus* (66) in Apple bark.

Adults August 8.
Monongalia county.

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98. **Eurytoma sp. a.**

PRIMARY PARASITE.
With *Scolytus rugulosus* (66) in Apple bark.

Adult Aug. 19.
Monongalia county.

99. **Eurytoma sp. b.**

PRIMARY PARASITE.
With *Scolytus rugulosus* (66) in Apple bark.

Adult Aug. 12.
Wood county.

100. **Eurytoma sp. c.**

PRIMARY PARASITE.
Attacks *Scolytus rugulosus* (66) in Apple, Peach, Cherry and Plum bark

Adults March 4, 25; April 17, 25; June 18, 22; July 25; Aug. 12.
Wood county.

101. **Eurytoma sp. d.**

PRIMARY PARASITE?
Attacks *Tomicus plagiatus* (11*a*. 63) in Pine bark.

Adult bred Oct. 14.
Monongalia county.

102. **Eurytoma sp. e.**

PRIMARY PARASITE.
Attacks *Phloeosinus dentatus* (75) in Cedar bark.

Adults bred May 4; July 24. Larvæ April 14. Adult emerged May 4.
Wood county.

103 **Eurytoma, sp f.**

PRIMARY PARASITE.
Attacks *Polygraphus rufipennis* (68) Larvæ in Black Spruce.

Adult Sept. 26.
Randolph county.

104. **Lochites sp. a.**

PRIMARY PARASITE.
Attacks *Polygraphus rufipennis* (68) in Spruce bark.

Adults March 31; April 14; May 9; July 13; Sept. 1. Pupæ April 2. Larvæ March 26, 28.
Randolph, Grant, Tucker and Monongalia counties.

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105. Lochites sp. b.

PRIMARY PARASITE.

Attacks *Tomicus cacographus* (59) *Tomicus calligraphus* (58) *Tomicus pini* (60). in pine bark.

Adults July 20. Aug. 12, 22.
Wood and Marshall counties.

106. **Lochites sp. d.**

PRIMARY PARASITE

Attacks *Dendroctonus frontalis* (77) in Pine bark.

Adults bred January; Larvæ December; October 10.
Monongalia county.

107. **Lochites, sp. e.**

PMIMARY PARASITE.

Attacks *Tomicus cælatus* (62 in Norway Spruce bark.

Adults July 13.
Monongalia county.

108. Chiropachys color, Linn.

PRIMARY PARASITE.

Attacks *Scolytus rugulosus* (66) in Apple, Peach, Plum and Cherry bark.

Adult March 17, 21; April 15; May ; June 18, 22, 26; July 20, 22, 25; August 8, 12; November 8; January 17. Larvæ January 17.
Wood, Monongalia and Marshall counties.

109. **Pteromalus sp. b.**

PRIMARY PARASITE.

Attacks *Phloeosinus dentatus* (75) in Cedar bark.

Adult April 18.
Wood county.

110. **Platygerrhus sp.**

PRIMARY PARASITE.

Attacks *Scolytus rugulosus* (66) in Apple bark.

Adults April 29.
Wood county.

111. **Heydenia unica,** Cook.

PRIMARY PARASITE.

Attacks *Dendroctonus frontalis* (77) in Pine bark.

Adults January . Larvæ November 7.
Monongalia county.

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112. **Spintherus sp.**

PRIMARY PARASITE.

Attacks *Polygraphus rufipennis* (68) in Spruce bark.

Cocoons September 1. Adults bred.
Randolph county.

113. **Trigonoderus** sp.

PRIMARY PARASITE.

Attacks *Polygraphus rufipennis* (68) in Spruce bark.

Adults April 14; June 23; July 10, 12; Sept. 1. Larvæ March 26. Randolph county.

114. **Chalcid.**

Belongs to sub-family Pteromalinæ.
Ashmead (in letter).

Bred from adult *Pityophthorus minutissimus* (8).

Adults emerged March 10.
Monongalia county.
In a letter dated March 16th, Mr. Wm. H. Ashmead says this is the first observation of the kind made in the family *Chalcididæ*.

115. **Decatoma sp.**

With *Polygraphus rufipennis* (68) in Spruce bark.

Adults July 12.
Grant county.

Order HYMENOPTERA; Family PROCTOTRYPIDÆ

116. **Aphalonomia hyalinipennis**, Ash.

With *Hypothenemus, sp. b.* (28) in White Walnut twigs.

Adults April 24.
Monongalia county.

Order HYMENOPTERA Family CHALCIDIDÆ.

(*Secondary Parasite.*)

117. **Tetrostrichus, sp. a.**

SECONDARY PARASITS?

Bred from *Thanasimus* larvæ in Sumach, and *Thanasimus dubius* (151) larvæ in Spruce bark.

Adults June. Larvæ March 29.
Tucker county.

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118. **Tetrastrichus sp. b.**

SECONDARY PARASITE?

With *Scolytus rugulosus* and *Chalcid* parasites of S., rugulosus, in Apple bark.

Aduts April 25. June 23, 26.
Wood county.

Order DIPTERA; Family MUSCIDÆ.

119. **Tachina sp.**

Bred from adult *Thanasimus dubius* (151.)

Larva emerged from beetle August 12, changed to pupa August 13.
Adult emerged August 28.
Monongalia county.

Predaceous Enemies, etc.

Order COLEOPTERA; Family STAPHYLINIDÆ.

120. **Quedius peregrinus.** Grav.

PREDACEOUS?

With *Scolytids* under Spruce bark.

Adult August 29.
Randolph county.

121. **Homalota sp.**

PREDACEOUS.

With *Tomicus cælatus* (62) *Tomicus pini* (60) *Polygraphus rufipennis* (68) in Spruce and *Dendroctonus frontalis* (77) in Pine bark.

Adults September 1, 22, 25; October 21, 22; April 17, 14; May 4, 30; July 13.
Randolph, Monongalia, Tucker, Wood and Pendleton counties.

122. **Xantholinus cephalus,** Say.

PREDACEOUS?

On bark of Black Spruce tree infested with *Polygraphus rufipennis;* (68.)

Adults march 29.
Tucker county.

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123. **Baptolinus longiceps,** Fab.

PREDACEOUS.

With *Polygraphus rufipennis* (68) in Spruce bark.

Adult September 1, March 28.
Randolph and Tucker counties.

124. **Siagonum americanum,** Melsh.

PREDACEOUS.

With *Dryocœtes autographus* (54) in Spruce bark, and *Dryocœtes n. sp.*, (55) in Birch bark.

Adults May 8; July 11. Larvæ May 8.
Tucker and Grant counties.

125. **Staphylinid larvæ.**

PREDACEOUS LARVAE.

With *Tomicus pini* (60) in Pine bark.

Larvæ July 20.
Wetzel county.

Order COLEOPTERA; Family ENDOMYCHIDÆ.

126. **Endomychus biguttatus,** Say.

With Scolytids under Pine bark.

Adults October 15; December 6.
Marion and Monongalia counties.

Order COLEOPTERA; Family COLYDIDÆ.

127. **Aulonium tuberculatum,** Lec.

With Scolytids in Pine bark.

Adults July 13.
Hampshire county.

128. **Colydium lineola,** Say.

PREDACEOUS.

With *Platypus quadridentatus*, (1) in sap wood of Black Oak. *Xyloterus politus* (39) in Red Maple. *Monarthrum mali* (5) in Jack Oak, and in Scolytid mines in Pine bark.

Adults July 13, 29, 30; August 19, 27; September 12.
Hampshire, Wayne, Tyler, Monongalia and Wood counties.

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129. **Sosylus costatus.** Lec.

PREDACEOUS.

With *Platypus quadridentatus* (1) in Black Oak.

Adult July 29.
Wayne county.

130. **Philothermus glabriculus,** Lec.

With Scolytids under Spruce bark. Under dead Locust bark.

Adults August 29; October 11.
Randolph and Monongalia counties.

Order COLEOPTERA; Family HISTERIDÆ

131. **Hister parallelus, Say.**

With *Drycætes autographus* (54) in Spruce; *Tomicus cacographus* (59) and *Gnathotrichus materiarius* (7) in Pine.

Adults May 18; June 24, 29; July 20; November.
Monongalia, Wood and Marshall counties.

132 **Hister cylindricus,** Payk.

With *Tomicus cacographus* (59) and *Tomicus calligraphus* (58) in Pine bark

Adults May 5, 8; August 12.
Wood and Pendleton counties.

133. **Paromalus bistriatus,** Er

With *Polygraphus rufipennis* (68) in Spruce bark.

Adults July 11; August 30.
Randolph and Tucker counties.

134. **Paromalus difficilis,** Horn.

With *Polygraphus rufipennis* (68) and *Dryocœtes affaber* (56) in Spruce bark.

Adults July 8, August 28; September 1. Pupæ July 8.
Randolph county.

135. **Plegaderus transversus,** Say.

With *Tomicus cacographus* (59) in Pine bark.

Adults June 24, 29; July 20.
Wood and Marshall counties.

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Order COLEOPTERA; Family NITIDULIDÆ.

136. **Colastus unicolor**, Say.

With *Pityophthorus confinis* (14) and *Tomicus calligraphus* (58). Under bark on dead Pine.

Adults May 4.
Pendleton county.

137. **Epuræa truncatella**, Mann.

With *Polygraphus rufipennis* (68) in Spruce bark.

Adults March 26; July.
Tucker and Grant counties.

138. Ips fasciatus, Oliv.

With *Xyloterus bivittatus* (37) on Spruce logs.

Adults May 8.
Grant county.

139. **Nitidulidæ larvæ**
Ips fasciatus?

With *Xyloterus bivittatus* (37) in Spruce wood. *Platipus compositus* (2) in Basswood, and *Cyllene Robiniæ* larvae in locust bark on living tree.

Larvæ May 14; June 1; July 9, 21.
Wood and Grant counties.

140. **Ips sanguinolentus**, Oliv.

PREDACEOUS.

With *Xyloterus politus* (39.) Under Sugar Maple bark, also feeding on Black Walnut sap.

Adults April 5; May 9.
Wood and Grant counties.

141. **Rhizophagus dimidiatus**, Mann.

With Scolytids under Spruce bark.

Adults March 26; September 1.
Randolph and Tucker counties.

142. **Rhizophagus bipunctatus**, say.

With *Scolytus rugulosus* (66) in Apple bark. *Monarthrum fasciatum* (4) in Beech bark and *Dryocœtes n. sp.* (55) in Birch bark.

Adults March 21; April 18; May.
Wood, Pendleton and Monongalia counties.

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Order COLEOPTERA; Family LATHRIDIIDÆ.

143. **Corticaria elongata**, Hum.
With *Tomicus calligraphus* (58) under bark on Pine.

Adults July 27.
Wirt county.

Order COLEOPTERA; Family TROGOSITIDÆ.

144. **Nemosoma cylindricum**, Lec.
With *Tomicus cacographus* (59) in Pine Bark.

Adults May 20.
Wood county.

145. **Tenebrioides corticalis**, Melsh.
Under bark on dead Apple tree and with *Phlœotribus frontalis* (72) in bark of live Mulberry.

Adults September 7. Pupæ April 25. Adult emerged May 12.
Monongalia and Wood counties.

Order COLEOPTERA; Family MALACHIDÆ

146. **Attalus scincetus**, Say.
With *Scolytus rugulosus* (66) in apple bark.

Adult March 21.
Monongalia county.

Order COLEOPTERA; Family CLERIDÆ.

147. Elasmocerus terminatus, Say.
PREDACEOUS.
With *Chramesus icorie* in Hickory.

Adult flying June 22. Adults bred from Hickory April 23.
Wood and Monongalia counties.

148. **Cymatodera bicolor**, Say.
PREDACEOUS.
With *Phloeosinus dentatus?* (75). in Cedar bark.

Adult May 15.
Wood county.

149. Clerus quadrisignatus, Oliv.
var **nigripes**, Say.
PREDACEOUS.
With *Tomicus cacographus* (59) and *Pityophthorus pultus* (10) in Pine bark; with *Phloeosinus dentatus* (75) in Red Cedar.

Adult April 29; May 4, 9.
Grant county.

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150. Thanasimus trifasciatus, Say.

PREDACEOUS

With *Polygraphus rufipennis* (68) under Spruce bark

Adult March 28; August 29; Larvæ March 28.
Randolph and Tucker counties.

151. Thanasimus dubius, Fab.

PREDACEOUS.

Attacks *Tomicus cacographus* (59), *Tomicus calligraphus* (58), *Dendroctonus frontalis* (77), *Pityophthorus pullus* (10), *P. puberulus* (19), *P. tyophthorus sp. d.* (20), in Pine bark. *Polygraphus rufipennis* (68), in Spruce bark, and *Hylesinus opaculus* (74) in Elm bark.
Enemy? 117. Enemy 119.

Adults May 2, 8, 30; August; September 1; October 6; November; Larvæ March 28, 31; May 3; July 21, 30; August 29; September 7; October 6, 10, 21.
Randolph, Tucker, Hampshire, Monongalia, Grant and Wood Counties.

152. Clerus formicarius, L.
=*? Thanasimus formicarius*, L.

THE EUROPEAN BARK BEETLE DESTROYER.

Destructive to Scolytids in European Coniferous forests. One thousand live specimens of adults, larvæ and pupæ, imported to America in October, 1892, by the West Virginia Experiment Station, aided by owners of pine forests. First adults collected by me in Government forest of Pinus Sylvestris near Hagenau, Alsace, Germany, August, 29, 1892. First adults set free in American pine forest near Morgantown, W. Va. On October, 10, 1892. This species was introduced to prey upon *Dendroctonus frontalis* and other species of Scolytidæ.

153. Thanasimus sp. d.

PREDACEOUS.

With *Scolytus rugulosus* (66) on Apple tree.

Adult June 17.
Upshur county.

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154 Thaneroclerus sanguineus, Say.

PREDACEOUS.

On Hemlock Stump with *Xyloterus bivittatus* (37)

Adult May 8.
Grant county.

155. Phyllobænus dislocatus, Say.

PREDACEOUS.

Attacks *Polygraphus rufipennis* (68) in Black Spruce, and *Pityophthorous consimilis* (15) in Sumach (*Rhus glabra.*) With *Scolytus rugulosus* (66) in Apple bark.

Adults bred June 16, 20, 22; Dec. 7.
Randolph, Wood and Monongalia counties

156. Clerid larvæ sp a.

PREDACEOUS.

With *Dedroctonus frontalis* (77) *Tomicus avulsus* (61) and *Tomicus cacographus* (59) larvæ in Pine bark.

Larvæ June 23, 29; Oct. 14.
Wood county.

157. Clerid larvæ sp. b.

PREDACEOUS.

With *Polygraphus rufipennis* (68) larvæ in Spruce.

Larvæ July 23; March 26.
Tucker and Wetzel counties.

157*a*. Clerid larvæ sp. c.

PREDACEOUS

With *Phloeotribus liminaris* (69) in Wild Cherry, and *Scolytus rugulosus* (66) in Apple bark.

Larvæ March 2; July 13.
Monongalia county.

158. Clerid Larvæ sp. d.

PREDACEOUS.

With *Scolytus rugulosus* (66) in Apple bark, *Scolytus quadrispinosus* (64) in Hickory bark and *Scolytus muticus* (65) in Hackberry bark.

Larvæ March 2; July 20; October 7; November 23.
Marshall and Monongalia counties.

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159. Clerid larvæ sp e.

PREDACEOUS

Tomicus pini (60) in pine bark.

Larvæ July 20.
Marshall county.

Order CLEOPATRA; Family TENEBRIONIDÆ.

160. **Hypophloeus Cavus**, Lec.

PREDACEOUS.

With *Xyleborus celsus* (44) in Hickory.

Adult July 22.
Tyler county.

161. Hypophloeus parallelus, Melsh.

PREDACEOUS.

With *Polygraphus rufipennis* (68) in Spruce bark, *Tomicus cacographus* (59) *Tomicus pini* (60) *Dendroctonus frontalis* (77) *Crypturgus pussillus* (78) in Pine bark, and *Chramesus icoriæ* (67) in Hickory bark.

Adults March 26; May 5, 18; June 24, 25, 29; July, 8, 13, 14, 20, 24; August; November 7. Larvæ August 12; October 12. Grant, Hampshire, Wood, Hardy, Monongalia, Pendleton, Randolph, Marshall and Tucker counties.

162. **Hypophloeus thorracicus**, Melsh.

PREDACEOUS.

With *Polygraphus rufipennis* (68) in Spruce bark.

Adult August 29.
Randolph county.

163. **Hypophloeus bicolor**, Melsh.

PREDACEOUS.

With *Xyleborus pubescens* (51) in Chestnut wood, *Xyleborus fuscati* (45) in Black Oak wood.

Adults May 20; July 30.
Wood county.

164. Tenebrionid larvæ.

PREDACEOUS.

With *Polygraphus rufipennis* (68) in Spruce bark.

Larva Aug. 30.
Randolph county.

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165. Hypophloeus sp. a.

PREDACEOUS.

With *Xyleborus sp. b.* (46) in Chestnut Oak wood.

Adult July 30.
Wood county.

166. Anthicus pubescens, Lec.

With *Scolytus rugulosus* (66) in Plum bark.

Adults April 25.
Wood county.

FUNGACEÆ.

168. Cylindrocola dendroctoni, Pk. (n. sp.) **Fungus Disease.**

On and with dead adults, larvæ, and pupæ of *Dendroctonus frontalis* under Pine bark. The fungus probably kills the insect Peck.

Collected, May 3, 4, 5.
Hampshire. Hardy and Pendleton Counties.
Species described in Flora, of W. Va., (Bulletin 24), page 51

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TREES AND SHRUBS INFESTED BY SCOLYTIDÆ.

Plants.	*Insects.*	
MAGNOLACEÆ.		
Cucumber Tree,	Platypus compositus, Say,	2
Magnolia acuminata, L.	Xyloterus politus, Say.	39
	Xyleborus pubescens, Zimm.	51
Tulip Tree, "Yellow Poplar."		
Liriodendron tulipifera, L.	Monarthrum mali, Fitch,	5
TILIACEÆ.		
Basswood,		
Tilia Americana, L	Platypus compositus, Say,	2
	Monarthrum fasciatum, Say,	4
	Monarthrum mali, Fitch	5
	Xyleborus pubescens, Zimn.	51
SAPINDACEÆ.		
Buckeye		
Aesculus octandra, Marsh.	Monarthrum mali, Fitch,	5
(*Aesculus flava*, Ait.)	Xyleborus pubescens, Zimn.	51
Sugar Maple,		
Acer saccharum, Marsh.	Platypus compositus, Say.	2
(*Acer saccharinum*, Wang.)	Xyloterus politus, Say,	39
Red Maple,		
Acer rubrum, L.	Monarthrum mali, Fitch,	5
	?Pityophthorus sp. b.,	11
	Xylotus politus, Say,	39

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ANACARDIACEÆ.

Stag-horn Sumach, *Rhus typhina*, L	Pityophthorus consimilis, Lec.,	15
Smooth Sumach, *Rhus glabra*, L	Pityophthorus consimilis, Lec.,	15
Dwarf Sumach, *Rhus copallina*, L.	Pityophthorus consimilis, Lec.,	15
Poison Ivy, *Rhus Toxicodendron*. L	Pityophthorus consimilis, Lec.	15
Poison Sumach, Poison Elder, *Rhus venenata*, L.	Pityophthorus consimilis, Lec.	15
Fragrant Sumach, *Rhus Canadensis*, Marsh	Pityophthorus consimilis, Lec.	15

LEGUMINOSÆ.

Honey Locust, *Gleditschia triacanthos*, L.	Monarthrum mali, Fitch.	5
	Xyleborus pubescens, Zimm.	51

ROSACEÆ.

Apple. *Pyrus malus*, L.	Pityopthorus sp. h	25
	Hypothenemus sp. a.	27
	Hypothenemus sp. c.	29
	Xyleborus xylographus, Say.	49
	Scolytus rugulosus, Ratz.	66
Pear, *Pyrus communis*, L.	Scolytus rugulosus, Ratz.	66
Peach, *Persica vulgaris*, Dec.	Scolytus rugulosus, Ratz.	66
	Phloeotribus liminaris, Harr.	69
Quince, *Cydonia vulgaris*, Dec.	Scolytus rugulosus, Ratz	66
Plum, *Prunus domestica*, L.	Scolytus regulosus, Ratz.	66
Cultivated Cherrry, *Prunus vulgaris*, L.	Monarthrum mali, Fitch,	5
	Xyleborus pubescens, Zim.	51
	Scolytus rugulosus, Ratz.	66
	Phloeotribus liminaris, Harr.	69
Wild Black Cherry, *Prunus serotina*, Ehrh.	Platypus compositus, Say.	2
	Dryocoetes n. sp.	55
	Scolytus rugulosus, Ratz.	66
	Phloeotribus liminaris, Harr.	69

CORNACEÆ.

Flowering Dogwood, *Cornus florida*, L.	Pityophthorus minutissimus, Zim.	8

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OLEACEÆ.

Black Ash,		
Fraxinus sambuiafolia, Lam.	Xyleterus politus, say.	39
	Hylesinus aculeatus, Say.	73

LAURACEÆ

Sassafras,		
Sassafras, officinale, Nees.	Corthylus punctatissimus, Zimm.	3

URTICACEÆ

Slippery, or Red Elm,		
Ulmus fulva, Michx.	Platypus compositus, Say.	2
White Elm,		
Ulmus Americana, L.	Hylesinus opaculus, Lec.	74
	Xyloterus politus, Say.	39
	Monarthrum mali, Fitch.	5
Hackberry, "Hoop Ash,"		
Celtis occidentalis, L.	Scolytus muticus, Say.	65
Black, or Red Mulberry,		
Morus rubra, L.	Phlœotribus frontalis, Oliv.	72

JUGLANDACEÆ

White Walnut, Butternut,		
Juglans cinerea, L.	Hypothenemus sp. b.	28
Black Walnut,		
Juglans nigra, L.	Hypothenemus sp. b.	28
Hickory,		
Hicoria, Raf.		
Carya, Nutt.	Xyloterus politus, Say	39
	Xyleborus celsus, Eich	44
	Xyleborus fuscatus, Eich.	45
	Xyleborus sp. d.	48
	Hypothenemus dissimils, Zimm.	32
	Hypothenemus sp. e.	33
	Scolytus quadrispinosus, Say.	64
	Chramesus icoriæ, Lec.	67

CUPILIFERÆ

Sweet, or Black Birch,		
Betula lenta, L.	Xyleborus pyri, Peck	41
	Dryocœtes n. sp.	55
	Xyloterus politus, Say.	39
White Birch,		
Betula populifolia, Ait.	Xyloterus politus, Say	39
	Xyleborus pyri, Peck	41
	Dryocœtes n. sp.	55

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White Oak, *Quercus alba*, L.	Monarthrum fasciatum, Say,	4
	Monarthrum mali, Fitch,	5
	Pityophthorus minutissimus, Zimm.	8
	Hypothenemus sp. f.	34
	Hypothenemus sp. g.	35
	Xyloterus politus, Say,	39
	Xyleborus sp. b.	46
	Xyleborus pubescens, Zimm.	51
Chestnut Oak, *Quercus prinus*, L.	Pityophthorus minutissimus, Zimm.	8
	Xyleborus sp. b.	46
Red Oak, *Quercus rubra*, L.	Monarthrum mali, Fitch,	5
	Xyloterus politus, Say,	39
	Xyleborus pyri, Peck.	41
Scarlet Oak, *Quercus coccinea* Wang.	Pityophthorus minutissimus, Zimm.	8
Black Oak. *Quercus tinctoria*, Bart.	Platypus quadridentatus, Oliv.	1
	Playtypus compositus, Say,	2
	Monarthrum fasciatum, Say,	4
	Monarthrum mali, Fitch,	5
	Pityophthorus minutissimus, Zimm.	8
	Xyloterus politus, Say,	39
	Xyleborus obesus, Lec.	43
	Xyleborus fuscatus, Eich.	45
	Xyleborus sp. b.	46
	Xyleborus sp. d.	48
	Xyleborus pubescens, Zimm.	51
Jack Oak, *Quercus nigra*, L.	Monarthrum mali, Fitch	5
	Pityophthorus minutissimus, Zimm.	8
	Xyleborus sp. b.	46
	Xyleborus sp. c.	47
	Xyleborus pubescens, Zimm.	51
Chestnut, *Castanea sativa*, Mill. var. *Americana*, Sarg.	Platypus quadridentatus, Oliv.	1
	Platypus compositus, Say,	2
	Monarthrum mali, Fitch,	5
	Xyloterus politus, Say,	39
	Xyleborus, sp. d.	48
	Xyleborus pubescens, Zimm.	51

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Beech,		
Fagus ferruginea, Ait.	Platypus compositus, Say,	2
	Monarthrum fasciatum, Say,	4
	Monarthrum mali, Fitch,	5
	Xyloterus politus, Say,	39
	Xyleborus pyri, Peck,	41
	Xyleborus obesus, Lec.	43

SALICACEÆ.

Large-toothed Aspen,		
Populus grandidentata, Michx.	Xyloterus retusus, Lec.	36

CONIFERÆ.

Red Cedar.		
Juniperus Virginiana, L.	Monarthrum mali, Fitch,	5
	Phloeotribus sp. b.	71
	Phloeosinus dentatus, Say.	75
	Xyleborus, sp. a.	42
White Pine,		
Pinus strobus, L.	Gnathotrichus retusus, Lec.	6
	Gnathotrichus meteriarius, Fitch,	7
	Pityophthorus sp. a.	9
	Pityophthorus sparsus, Lec.	12
	Pityophthorus sp. d.	24
	Tomicus callographus, Germ.	58
	Tomicus cacographus, Lec.	59
	Tomicus pini, Say,	60
	Tomicus avulsus, Eich.	61
	Tomicus caelatus, Eich.	62
	Dendroctonus terebrans, Oliv.	76
	Dendroctonus frontalis, Zimm.	79
	Crypturgus pusillus, Gyll.	80
	Hylurgops glabratus, Zett.	82
Pines.*		
White Pine.		
Pinus strobus, L.	Monarthrum fasciatum, Say,	4
Loblolly Pine,	Monarthrum mali, Fitch,	5
Pinus Taeda, L,	Gnathotrichus retusus, Lec.,	6
	Gnathotrichus materiarius,	
Pitch Pine,	Fitch,	7
Pinus rigida, Miller.	Pityophthorus, sp. a ,	9
Table Mountain Pine,	Pityophthorus, pullus, Zimn.	10
Pinus pungens, Michx.	Pityophthorus, plagiatus, Lec.,	11*a*
Scrub Pine,	Pityophthorus, sparsus, Lec.,	12
Pinus Virginiana, Miller.	Pityophthorus, confinis, Lec.,	14
(*Pinus inops*, Ait.)	Pityophthorus, lautus, Eich ,	18

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Yellow Pine,	Pityophthorus, puberlulus, Lec.	19
Pinus echinata, Miller,	Pityophthorus, sp. d.,	20
(*Pinus mitus*, Michx.)	Pityophthorus, sp. e ,	21
	Pityophthorus, sp. f.,	23
	Pityophthorus, sp. g.,	24
	Hypothenemus, sp. d.,	31
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	Xyleborus sp. f.,	52
	Tomicus callographus, Germ.	58
	Tomicus cacographus, Lec.,	59
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	Tomicus avulsus, Eich.,	61
	Tomicus caelatus, Eich.,	62
	Dendroctonus terebrans, Oliv.,	76
	Dendroctonus frontalis, Zimm.	77
	Crypturgus pusillus, Gyll.	78
	Hylastes sp.,	79
	Hylurgops glabratus, Zett ,	80
Black Spruce,		
Picea mariana, (Mill.) B. S. P.	Pityophthorus cariniceps, Lec.	13
(*Picea nigra*, Link.)	Pityoyhthorus hirticeps, Lec.	16
(*Abies nigra*, Poir.)	Pityophthorus sp. c.	17
	Pityophthorus tuberculatus, Eich,	22
	Xyloterus bivittatus, Kirby.	37
	Xyloterus polytus, Say,	39
	Dryocoetes autographus, Ratz,	54
	Dryocoetes affaber, Mann.,	56
	Dryocoetes granicollis, Lec.	57
	Tomicus cacographus, Lec.	59
	Tomicus pini, Say,	60
	Tomicus cælatus, Eich.	62
	Polygraphus rufipennis, Kirby,	68
	Dendroctonus frontalis, Zimm.	79
	Crypturgus pusillus, Gyll.	80
Norway Spruce (foreign.)		
Picea excelsa, De candolle.	Dryocoetus autographus, Ratz.	54
	Tomicus cacographus, Lec.	59
	Tomicus pini, Say.	60
	Tomicus cælatus, Eich.	62
	Dendroctonus frontalis, Zimm.	79
	Crypturgus pusillus, Gyll.	80
Hem'ock,		
Tsuga Canadensis, Carr.	Monarthrum fasciatum, Say.	4
	Monarthrum mali, Fitch,	5
	Xyloterus bivittatus, Kirby	37
	Xyloterus politus, Say,	39
	Xyleborus pyri, Peck	41
	Xyleborus obesus, Lec.	43

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